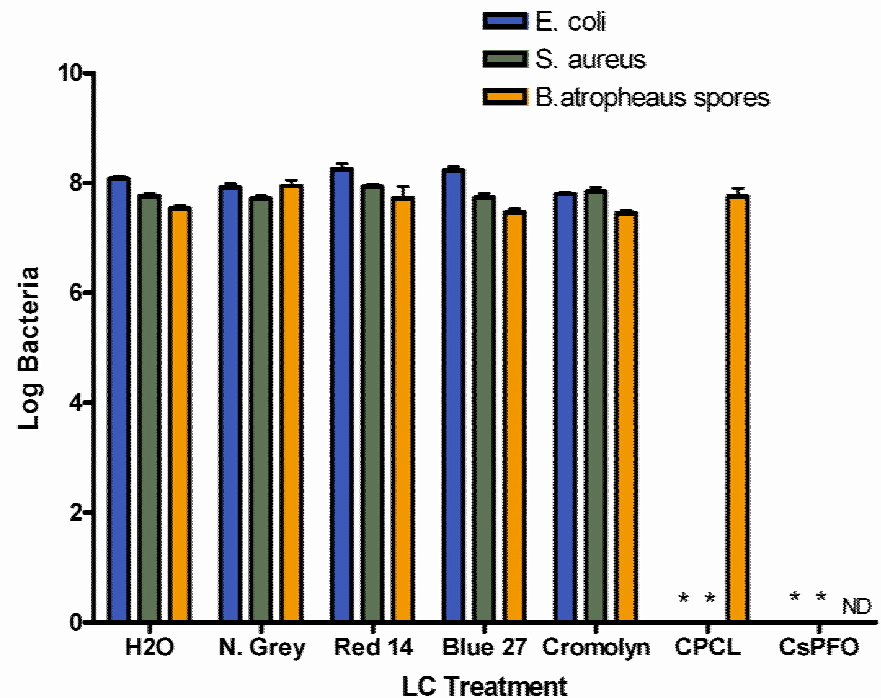


# ACT/SGER: Liquid Crystal Materials for Biosensor Development,

Oleg D. Lavrentovich and Christopher J. Woolverton,

Kent State University, DMR-0346348

We develop real-time (minutes) sensors of microbes such as anthrax and *E. coli*, using the structural changes in lyotropic liquid crystals (LLCs) caused by antibody-antigen binding reaction. Six LLC materials were tested for toxicity to three different bacteria. We found that the so-called Chromonic LLCs were not toxic compared to water while the surfactant-based LLCs such as CPCL and CsPFO were toxic to one or more bacteria. Thus, chromonic LLC can be used in biosensor development without altering the bacteria being detected.



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## Broader impact

The aim is to shorten dramatically the time needed for microbe detection, for example, in the case of anthrax, from few days to few minutes, which is of great importance to national security.

## Multidisciplinary collaboration and Education

The project targets the whole new concept of LC-based bio-detection as sketched in the figure; it involves truly multidisciplinary cooperation of graduate students at the Liquid Crystal Institute (Tod Schneider and Hui Liu) and Department of Biological Sciences (Shannon Miller – Helfinstine), and undergraduates (Melissa Burger, Concordia University Nebraska, Chemistry major, REU student at Kent State, summer 2004).

